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Leisure Activities of Adolescents and the Role of Neighborhood Open Space – Evidence from Dhaka City

Dr. M. Shafiq-Ur Rahman[1]
A. Z. M. Solaiman Muhit[2]

Abstract

This paper explored the existing leisure activities (LA) of adolescents in Dhaka city and the influence of open space on LA. A total of 152 adolescents were selected through snowball sampling from 20 different areas of the city. Participants' notes of the adolescents for a week and their questionnaire survey was conducted, and the parent of adolescents were interviewed to explore current leisure practice. Subsequent reasons-based thematic analysis was done to investigate the impacts of open space on LA. Existing leisure activities of the respondents reveal that very low outdoor or physical activities but very high on screen-based activities. Factors that significantly influence outdoor leisure practice is socio-economic factors such as gender, age, adult's accompany to school, friends in neighborhood and the years living in the area. Adolescents' attitude to LA, their safety perception and parents' control over outdoor leisure, residency floor and access to rooftop or garage as well as the width, crowding and cleanliness of adjacent street significantly influence outdoor leisure activities (OLA). The quantity, proximity, size and safety of the open spaces have significant impact on OLA of adolescents in Dhaka city. Thus, lack of open space may have negative impacts on physical and mental growth of adolescents.

Keywords: adolescent, open space, leisure, outdoor, physical activity (PA), leisure activity (LA)

1. Introduction

Leisure activities (LA) provide many important benefits to people (Driver 1996). Conceptually, leisure activities have been described by many researcher (e.g. Erikson 1968, Kleiber 1999, Waterman 1990) as a prime context for adolescents to discover interests and formulate a personal identity. Outdoor leisure activities (OLA) usually provide the opportunity for children and adolescents to be physically active and healthy. Developing a habit of physical activity (PA) in early years is crucial as this period lays the foundation for later life (Jess & McEvilly 2013). Hallal et al (2006) identified a strong evidence of the beneficial effects of PA on physical and mental health of adolescents. World Health Organization (WHO) in 2005 claims that the PA is one of the basic preventive measures for non-communicable diseases and young people in developing countries are more at risk of non-communicable diseases than that of developed countries. The LA are critically important to adolescent's development because they have more autonomy and exert more voluntary control in these than in other daily activities (Silbereisen et al. 1986, Silbereisen & Todt 1994). Therefore, it is recommended that all the

[1] Professor, Department of Urban & Regional Planning, Jahangirnagar University, Dhaka 1342, Bangladesh (Email: shafiq_urp@yahoo.com)
[2] Assistant Consultant, Oxford Policy Management, UK

adolescents should practice 60 minutes of moderate to vigorous intensity PA on most days of the week (Biddle et al. 1998). However, despite having benefits of a physically active lifestyle, children and adolescents are now-a-days becoming more and more sedentary (Dollman 2005). Thus, as Bauman (2009) mentioned, the levels of physical inactivity are rising both in developed and developing countries with major implications for increase in the prevalence of non-communicable diseases and the general health of the population worldwide.

Higher levels of park use are often linked to the higher levels of PA (Bedimo-Rung et al. 2005). However, the relationship between park proximity and PA remains unclear. Several studies among adults and older adults in Canada reported the presence of nearby parks is positively associated with different measures of PA (Kaczynski & Henderson 2008, Cohen et al. 2007), whereas other studies found no such relationship (Jilcott et al. 2007, Nagel et al. 2008, Witten et al. 2008). Similarly, measures of park quality have been linked to different measures of PA among adults and older adults in some studies (e.g. Bai 2013, Giles-Corti 2005), but not in others (Kaczynski & Henderson 2008, Sugiyama & Thompson 2008, Sugiyama et al. 2010).

In urban areas of Bangladesh, children and adolescent population covers more than one third of the total urban population (Angeles et al. 2008). Day by day children are getting more involved in sedentary activities, for instance, watching TV, playing video games and computer games (Ahmed & Sohail 2005). According to Prothom-alo (2017), most of the youth in Bangladesh usually spend their leisure time in 'screen related' activities such as watching TV, using social media and internet browsing. Children living in urban areas are also alarmingly adopting more inactive lifestyle (Islam et al. 2014). In urban areas, most time are spent with screen activities which is responsible for some physical and mental illness among the adolescents of the country (Daily Star 2017).

Dhaka is the most densely populated cities in the world. The city cannot meet the basic facility needs of its citizens. Its open space is inadequate for recreation facilities of large population size. Open space inadequacy is most influential on the children and adolescents (Ahmed & Sohail 2008). The Daily Star (2017) also stated that about 80% teenagers of Dhaka usually spend more than two hours screen-time in a typical day. Another report of WHO claims that the leisure time physical activity is not popular in present urban culture in Bangladesh and lack of urban planning is one of the major reasons for physical inactivity among urban population.

Although a survey on leisure activities of the youth in Bangladesh was conducted in 2017 by Prothom-alo, a little is known about the LA practice by the adolescents in urban areas of the country, especially in Dhaka city. Several studies have shown the link between variables related to open space and children's outdoor activity (Handy et al. 2008). However, yet very little is understood about this relationship particularly in the contexts of developing country cities where reduction in children's outdoor time is also a public health issue (Khan et al. 2011, Luo & Hu 2002, Shafique et al. 2007). Moreover, most of the previous research explored the relation between open space and OLA mainly using quantitative techniques and a very few used qualitative methods. Therefore, the main purpose of this paper is to identify the existing leisure activities of adolescents and the influence of open space on their leisure activities in Dhaka city.

2. Methodology

A mixed method procedure and three-phase of data collection was followed. A total 152 adolescents were selected through snowball sampling from 20 different areas of the city. Participants' note for a week was used to explore their current leisure practice and 108 valid responses (49 female and 59 male) were received. The participant's note had columns and rows so that the participants can write each practiced leisure activity with the time, duration, location of the activity and the distance from residence. Every evening the research assistants phoned to the participants for reminding them to write the notes of that day. After completing 7-days data collection using participants note, the respondents were asked to fill up the questionnaire. Finally, two category of phone interviews - one with the adolescents and another with one parent of the adolescent – were conducted. Interview with a particular adolescent and his/her parent was conducted in separate time so that there was no chance of influence ones answer by another's and recorded in phone.

The scope of this research is limited to the student adolescents aged 13-19 years from the household of middle-income groups. All types of indoor, outdoor, school leisure activities including day-rest time spend over 5 minutes were considered as LA. Both public and private open space such as parks, playgrounds, lakesides and neighborhood streets were considered. Data were collected in January and February 2019 to ensure that during the survey the samples are in a regular life activity (not in their vacation or exam period). Collected data were analyzed using both quantitative and qualitative techniques. The notes, survey questionnaire and phone interview records were processed, transcribed, and translated. Some codes were identified from each of the answers and then categorized under some pre-determined categories. Subsequent reasons-based thematic analysis was done to investigate the effects of having or not having open space on leisure activities through exploring the relationship of open spaces proximity and quality with OLA, comparison of practiced and desired LA, and the relationship between the open space environment and LA.

3. Existing Leisure Activities of Adolescents

3.1. Average Leisure Time

Leisure activities can be different across the culture and regions around the world. Though there are some data available on leisure time for youth in Bangladesh, no specific information is available particularly for the adolescents in urban contexts or in Dhaka city. Data of this study reveal that the adolescents in Dhaka spend average 4.8 hours per person per day (or 33.4 hours in a typical week) for LA. Most common leisure time of the day are in the afternoon (4.00-6.30 pm), after school (2-4 pm) and at night (8.30- before sleep) for 37%, 24%, and 19% of the adolescents respectively. This is because only a few respondents (6%) have school in the afternoon (2-4 pm) whilst for the most the school time is in the morning shift. Leisure time spent in the morning (up to 8 am) is only by 2%, in the evening by 12% and at school by 6% of the respondents. The total amount of daily leisure time for each adolescent in weekdays and weekend is different – average 4.6 hours and 5.9 hours respectively. This difference is mainly because all the respondents are students who get more time during weekends to dispose for leisure. This information is in line with literature – leisure time significantly differs between weekdays and weekend.

3.2. Leisure Activities (LA)

No secondary data are available on adolescents' LA in Dhaka city. According to the survey data 2017 of the Prothom-alo, youths in Bangladesh spend their leisure time mostly for watching TV. A significant portion of leisure time is spent for using internet or communicating in social media; however, time spend for the outdoor activities such as sports and hangout is very low. Table 1 shows a comparison between whole country and Dhaka city; adolescents in Dhaka usually spend the highest portion of daily leisure time for watching TV (43.1 minutes) and the lowest (4.2 minutes) for physical exercise. The large portions of daily leisure time are spent in social media (35.8 minutes), for taking rest (34.5 minutes) and playing video games (19.6 minutes) whilst little portions are spent for hobbies such as singing, drawing, scientific experiments (5.8 minutes), listening music and radio (5.9 minutes), as in Figure 1.

Table 1. Comparison of leisure activities of adolescents in Dhaka with whole Bangladesh

Most leisure time spend for activities		**Least leisure time spend for activities**	
Bangladesh (Prothom-alo, 2017)	**Dhaka City (This study, 2019)**	**Bangladesh (Prothom-alo, 2017)**	**Dhaka city (This study, 2019)**
Watching Television	Watching Television	Reading books and newspaper	Physical Exercise
Gossiping with friends and family	Social Media	Hangout	Singing, Drawing and Scientific Experiment
Sports	Taking Rest	Sleeping	Listening music and radio

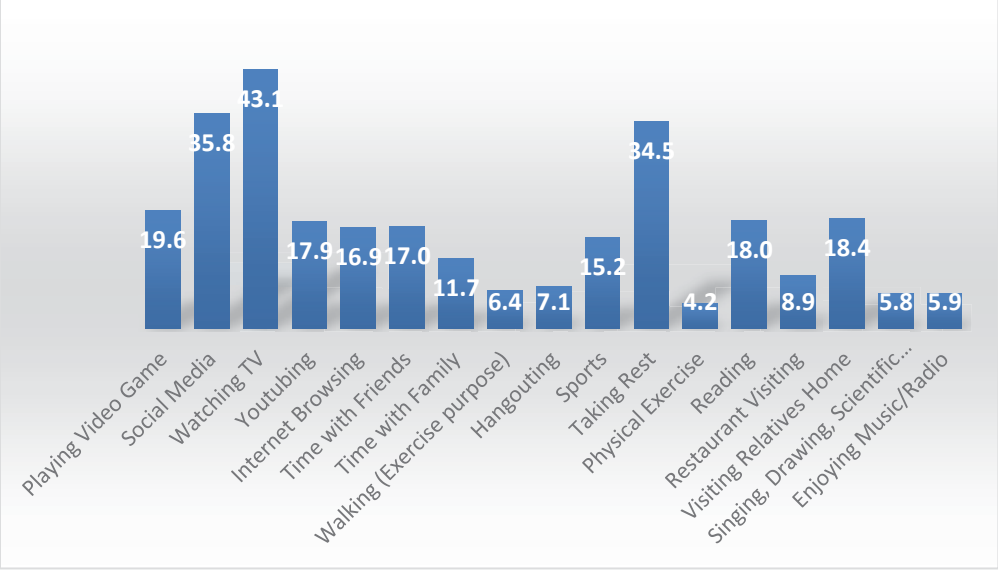

Figure 1. Daily time (minutes) spend for different leisure activities in Dhaka city

Even though the adolescents in Dhaka spend their highest portion of daily leisure time in watching TV, every day the majority of the adolescents (58%) use social media. Other daily leisure activities for which the majority of adolescents spend their leisure time are watching TV (57.9%), taking rest (38%), playing video games (27.4%) and youtubing (25.9%), but a very little portion for visiting restaurant (8.1%), physical exercise (11.8%), hangouting (11.6%) and hobbies (13.2%), as shown in Figure 2. About 28.2% of the adolescents listen music or radio every day, though their daily average time spend for this is only 5.9 minutes.

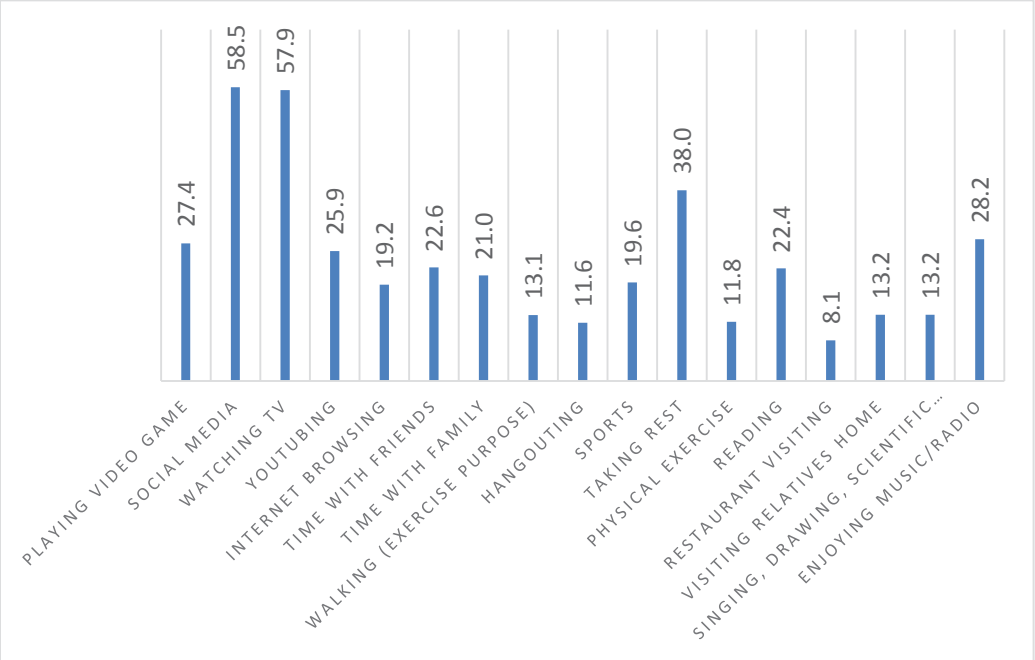

Figure 2. Percentage of the adolescents' involved in different daily leisure activities in Dhaka city

3.3. Outdoor Leisure Activities and Time

Adolescents in Dhaka spend daily average 76.2 minutes for outdoor leisure activities; however, it is 127 minutes in the weekend and 67.7 minutes in the weekdays (Figure 3). This daily average time for outdoor activities is very high compared with the results of Islam et al (2014) which is 41.25 minutes but very low than the recommended outdoor leisure time by many researchers which is 2 hours. It is worth mentioning that the leisure time in school and visiting restaurant or relatives' home were considered as the outdoor leisure activities in this study, but not in the study of Larson & Verma (1999) for American or UK Time Use Survey (2014-15). Without considering these as the outdoor leisure, the average daily outdoor time in Dhaka is around 30 minutes. Adolescents in Dhaka usually practice following outdoor activities: time with friends for gossiping (23.5%), sports (20.5%), walking for exercise (14%), visiting relative's home (13%), hang outing (12.5%), visiting restaurant (8%), and outdoor physical exercise (8%). However, of the average daily outdoor leisure time 76.2 minutes, they mainly spend time on following

activities: visiting relatives' home (24%), gossiping with friends (22%) and participating in sports (20%) but very less time on following tasks: physical exercise (4%), walking for exercise purpose (9%) and hang outing (9%).

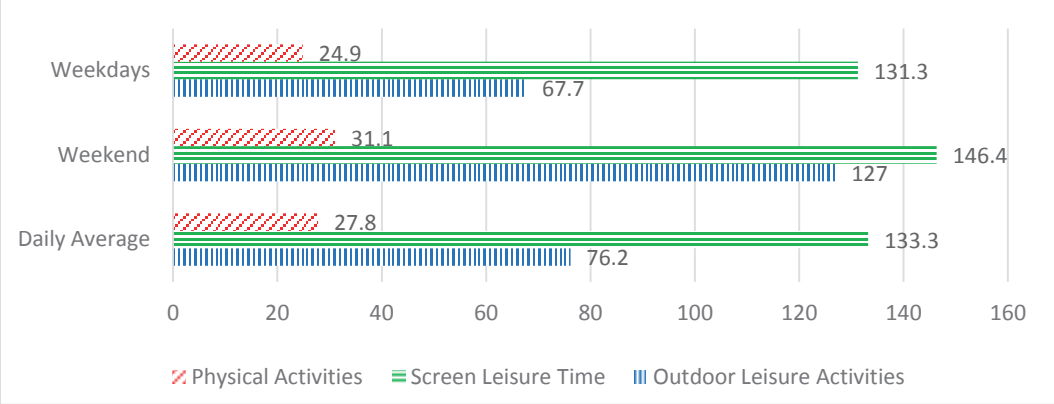

Figure 3. Daily average time in outdoor leisure activities, screen leisure activities, and physical activities in Dhaka

About 25% of the sample adolescents in Dhaka city spend daily leisure time up to 30 minutes whilst 28.4% spend up to 60 minutes and 25% spend 60-90 minutes. This very low time may increase the possibility of much sedentary behavior among the adolescents because Gray (2015) showed outdoor activity and sedentary behavior is disproportionate in practice. In 2008, around 32% of Dhaka's people who spent 60-90 minutes for outdoor leisure activities are children (Islam et al. 2008). About 79% of daily outdoor leisure time (60.3 minutes) of the adolescent in Dhaka city are spend within their neighborhood. During the weekend, this share of outdoor leisure time within neighborhood reduces to 66% of the daily total time because they visit relatives and restaurants located far from residence. On the other hand, adolescents in Dhaka spend about 95% of their daily outdoor sports time within neighborhood and the other 5% are organized at school and outside the neighborhood. The least portion of outdoor leisure time within neighborhood is for visiting relatives.

3.4. Screen-related Leisure Time

Adolescents in Dhaka are spending daily average 133.3 minutes on screen-based leisure activities whilst in weekdays it is 131.1 minutes and in weekend 146.4 minutes (in Figure 3). Though compared with developed countries the daily average screen-time practice of adolescents in Dhaka is less, the percentage of adolescents daily involved in screen-activities is high in Dhaka. Daily time spend for SLA is less than one hour by 8.3%, less than 2 hours by 58.3%, more than 2 hours by 40% and more than 3 hours by 15.7% of the adolescents. Of the total average daily screen-based leisure time, 32% (43.1 minutes) is for watching TV, 27% for social media, 15% for playing video games, 13% for youtubing and 13% for internet browsing. In total, adolescents in Dhaka everyday spend more time (70.6 minutes) for online than watching TV. This result is similar to the UK time use survey (2017) where the average daily time spend online is higher than watching TV (3 hours and 2.1 hours respectively). More than half of the respondents spend time every day in

social media and for watching TV whist about 20% to 25% of the respondents spend time for video games, youtubing and internet browsing (Figure 4).

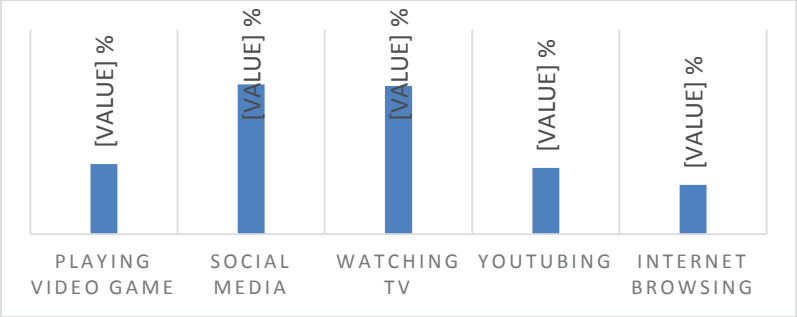

Figure 4. Adolescents' daily involvement (%) in SLA in Dhaka

3.5. Physical Leisure Activities

Physical activity usually helps to enhance the quality of life for people of all ages and abilities. This study found average daily 27.8 minutes physical activity of adolescents in Dhaka (in Figure 3). Most portion of the time spend for PA (59% of total) is in sports whilst only 29% is for walking and cycling, a little portion (11%) is for physical exercise. Only 4% of the adolescents do practice the recommended level (two hours) of daily PA and the 96% are with insufficient PA. Whatever, 20.4% adolescents perform no moderate or vigorous PA. The daily average moderate level of PA (side walking and cycling) is only 6.4 minutes where the vigorous PA (sports and physical exercises) is only 21.4 minutes. Average daily moderate PA is almost same in weekdays (6.3 minutes) and weekend (6.9 minutes) where little more of vigorous PA is reported in weekend day (24.2 minutes) than weekday (18.6 minutes).

3.6. Relation between Outdoor, Physical and Screen Leisure Activities

Some studies, namely Sugiyama et al. (2010) and Reis (2009), reported a significant reverse relationship between physical activities and screen-leisure activities though Graham (2014) found no significant relationship. Results of this research showed (Table 2) relationship between outdoor and physical leisure time is positive and strong with a coefficient of 0.699; between outdoor and screen-leisure time have weak reverse relationship with a coefficient of -0.25; between physical and screen-leisure activity is insignificant.

Table 2. Relation among outdoor, screen and physical leisure activities in Dhaka City

Activities	OLA	SLA	PLA
OLA	1	-0.251**	0.699**
SLA	-0.251**	1	-0.177
PLA	0.699**	-0.177	1
Pearson Correlation	N =108	**. Correlation is significant at the 0.01 level	

4. Influence of Open Space on Adolescents' Leisure Activities

Almost half (41.5%) of the adolescents in Dhaka city mentioned that within 15-minutes of walking distance from the residence they have no open space whilst 38% have only one open space, 12% have two and 8.5% have three open spaces. The overall condition of the open space was assessed in terms of the adolescents' perception about quality, distance from home and the quantity of the available instruments and facilities in open space.

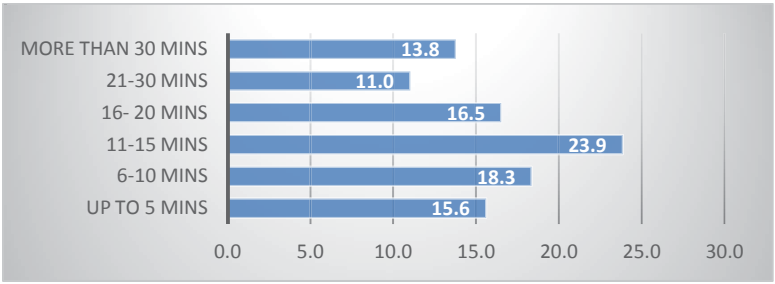

Figure 5. Distance to nearer open space from residence

Figure 5 shows only a small portion (15.6%) of the adolescents have an open space within 5-minutes of walk (about 500m distance considering 12 km/hour walking speed) from the residence whilst 18.3% have within 5-10 minutes of walk (equivalent to 1 km). The highest portion (23.9%) reported having nearer open space from their residence within 11-15 minutes of walk and a quarter (24%) mentioned more than 20 minutes of walk to reach the nearer open space from residence.

4.1. Quality of the Open Space

Quality of the open space nearer to residence was measured according to respondents' perceptional viewpoints. Satisfaction about the size, available instruments and facilities, and safety in open spaces were measured using a five-point Likert Scale. About the size (available useable and accessible portion of the open spaces by common people) of the nearer open space, no respondents were very satisfied and more than a quarter (28%) of them expressed neutral position whilst 37% are unsatisfied and 29% are very unsatisfied but only 6% are satisfied (Figure 6).

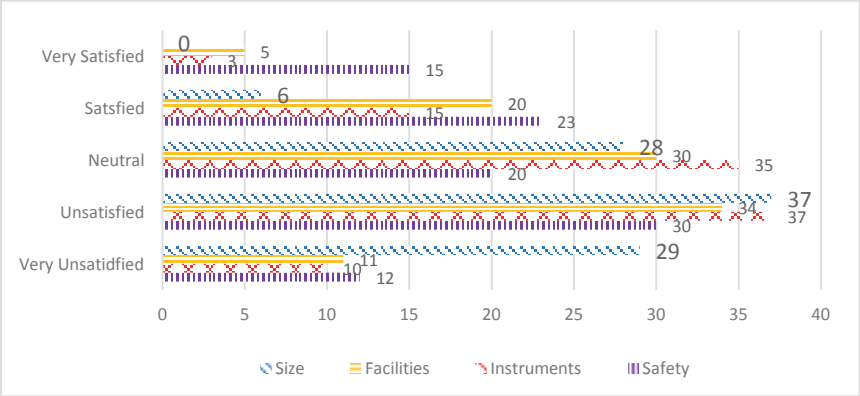

Figure 6. Respondents satisfaction about the size, facilities, instruments and safety of the available open space

Most of the adolescents (37%) are unsatisfied with the available instruments of playing, exercise and other recreation in their nearest open space. One in every 10 adolescents expressed their highly dissatisfaction whilst a large portion (35%) kept their neutral position though a quarter is satisfied of which 15% are somehow satisfied and 10% are highly satisfied with available instruments in nearer open space. Regarding the available facilities such as physical characteristics, washroom, sitting space, water supply etc in nearer open space, 34% of the adolescents expressed their unsatisfaction and bout 11% expressed their extreme level of dissatisfaction. Only a quarter was satisfied (where 20% and 5% are respectively somehow satisfied and highly satisfied) though a large portion (30%) kept neutral position. In terms of the safety in the nearer open spaces, about 30% are unsatisfied and 12% are very unsatisfied but 23% are somehow satisfied and 15% are very satisfied whilst 20% provided neutral perception about safety. Those who are unsatisfied or very unsatisfied (42% of the adolescents), four in six are female.

4.2. Relationship between Outdoor Leisure Activities and Open Space

The correlation between outdoor leisure times of the adolescents with different factors of open space were tested to identify the significant factors influencing the adolescents' outdoor leisure activities (OLA). Bivariate correlation was identified using Pearson correlation (for continuous factors) and Spearman correlation (for ordinal level factors).

Table 3. Correlation between outdoor leisure time and open space factors

		Quantity	Distance	Size	Instruments	Facilities	Safety
Outdoor Leisure as portion of total Time	Correlation Coefficient	0.658**	0-0.595**	0.442**	0.087	0.102	0.801**
	Sig. (2-tailed)	0.000	0.000	0.000	0.372	0.292	0.000
		**. Correlation is significant at the 0.01 level (2-tailed).					

Among the six correlations, as shown in Table 3, four were found significant at the $p < 0.01$ level (2-tailed). The 'quantity' of open space within 15-minutes walking distance from residence, 'size' of the open space and 'safety' perception about open space are positively correlated with the outdoor leisure time where the 'size' is moderately influential but the other factors are strongly influential. The 'distance' to open spaces from residence is also found significant and has a strong negative correlation with outdoor leisure time.

The average daily OLA are less among the adolescents and so as the PA which is reflected with strong relationship between OLA and physical LA. Difference is found in consuming time of OLA with the distance of adolescent's residence from nearer open space. The average time of outdoor leisure activities increases for the adolescents having residences nearer to open space and decreases with distance increasing between open spaces from their residence. That means time spend in OLA is disproportionately related to the distance between residence and open space. Average daily time spend in OLA is 88.7 minutes for respondents with walking distance up to five-minutes between residence and nearer open space, 68.8 minutes (22.4% decline) if walking distance is 6-10 minutes, and only 22 minutes when residence is far away (more than 30-minutes of walk)

from nearer open spaces, as seen in Table 4. Thus, it could be concluded that adolescent's OLA practice in Dhaka is disproportionately related to the distance between residence and open space.

Table 4. Time spent in outdoor activities with distance of open space from residence

Distance of open space from residence (walk)	Daily Outdoor Activities (minutes)	% Decrease of Previous one	Outdoor Activities (% of total leisure time)
Up to 5 minutes	88.7	---	34.3
6-10 minutes	68.8	22.4	25.2
11-15 minutes	72.8	- 5.8	23.7
16- 20 minutes	46.5	36.1	18.9
21-30 minutes	34.2	26.5	15.0
More than 30 minutes	22.0	35.7	6.9

Source: Field survey, 2019.

4.3. Desired Leisure Activities of Adolescents

The respondents were asked to rank their priority of desired leisure activities (DLA) in the questionnaire (in ascending order) assuming that all the leisure facilities (both indoor and outdoor) are available. The multiple responses of the ranking of desired leisure activities were summarized using the following weighted index:

> Rating of a Leisure Activity Index Value (X) = (17*number of times X desired at rank 1 + 16* number of times X desired at rank 2 + 15* number of times X desired at rank 3 + ……+ 1* number of times X desired at rank 17)

Table 5. Ranking of the adolescents' desired leisure activities

Rank	Index Value	Activity
1st	1172	Sports
2nd	1122	Gossiping with Friends
3rd	952	Hangouting
4th	949	Social Media
5th	913	Playing Video Game
6th	913	Physical Exercise
7th	874	Youtubing
8th	872	Watching TV
9th	847	Listening Music & Radio
10th	841	Walking & Cycling
11th	832	Time with Family
12th	806	Reading

Rank	Index Value	Activity
13th	756	Hobbies
14th	671	Visiting Restaurants
15th	503	Taking Rest
16th	458	Internet Browsing
17th	287	Visiting Relatives

4.4. Comparison between the Desired and Practiced Leisure Activities

Adolescents' self-notes provided information about their existing practice of leisure-time activities; however, this do not provide any proof whether these LA are also their DLA. Hildson (2009) claimed that some factors may force the adolescents for substituting from DLA to PLA. Table 6 shows the existing PLA as well as DLA of adolescents in Dhaka.

Table 6. Adolescents' practiced and desired leisure activities in Dhaka city

Practiced Leisure Activities	Priority Ranking	Desired Leisure Activities
Watching TV show	1	Sports
Social Media	2	Gossiping with Friends
Taking Rest	3	Hangouting
Video game	4	Social Media
Youtubing	5	Playing Video Game

This study found 65 adolescents (61.2%) ranked outside leisure activities in the first 5 desired activities. The practiced activities of those respondents were then analyzed to validate whether their practiced activities support their desired list (outdoor on top) or differ. The comparison shows that daily screen-leisure activities is more than the OLA for 85% of them who prioritized OLA most in desired list and PLA of only 15% of the respondents' do support their DLA.

The comparison of current PLA and DLA (Table 6) provides a contrast picture. Top three in DLA are outdoor activities; however, these are in the middle or bottom of the list of practiced leisure activities. On the other hand, screen-time leisure activities are at middle in the DLA list but at the top in the current PLA. A different picture of desired and practiced leisure time activities indicate that some factors may influence the adolescents for substitution of LA especially the outdoor activities. Thus, adolescents in Dhaka currently practice leisure time activities different from their desired leisure time activities driven by some influencing factors.

4.5. Reasons for Difference between Practiced and Desired Leisure Activities

During the interview, the adolescents whose DLA differs from PLA were asked about the major causes for such difference between DLA and PLA. The adolescents talked about some reasons, whose they thought of pushing them to such substitution in leisure time activities. The answer of those 55 respondents were coded and grouped and following three major causes are identified: inadequacy of open space (39%), distance to open spaces (26%), and the safety in open space (35%). This information is related to the

relevant literature. For instance, Coombes (2010) identified safety situation at open space and Hildson (2009) identified distance of the open space from residence as an important factor that influence visiting that open space. Thus, the findings reveal that the inadequacy of open space influences the leisure time activities (difference between desired and practiced) of the adolescents in Dhaka city.

4.6. Reasons behind Choosing Currently Practiced Leisure Activities

The adolescents were asked why they are practicing such screen-based leisure activities (SLA) as substitute of the desired (or outdoor) leisure activities. Their answers were characterized in four categories, as shown in Table 7. Adolescents' DLA related to outdoor are replaced by current SLA because usually they do not get facilities related to outdoor activities. Availability of facilities related to SLA also influences them for such choosing. That means, adolescents would choose open space related LA if the open space are available.

Table 7. Reasons behind choosing currently practiced leisure activities.

Reason for existing practiced leisure activities (PLA)	Number of supporting Participants
Replaced activities	4 out of each 5
Attraction increased with time	2 out of each 7
Availability	2 out of each 3
Get a virtual community	1 out of each 5

Table 8. Desired leisure activities to Replaced practiced leisure activities

Desired leisure activities	No. of supporting Respondents	Replaced practiced leisure activities
Sports	More 4 out of each 7	Playing Video game
Sports	2 out of each 5	Watching game on TV
Gossiping	More than 4 out of each 7	Social media
Hangout	2 out of each 5	Social media
Hangout	3 out of each 10	TV

Outdoor sports are the most DLA for the adolescents in Dhaka city. As the playgrounds and open spaces are now inadequate in Dhaka city, adolescents are unable to enjoy outdoor playing. Six of each ten participants said that they replace the desired sports activities through playing video games in smartphone and computer. Some of them replace sports by watching games on TV. Adolescents enjoy communicating in social media instead of gossiping and hangout. Inadequate open space pushed the adolescents for replacement of OLA by home-based SLA.

5. Discussion and Conclusion

This paper provides a brief about the current practice of LA of adolescents aged 13 to 19 years in Dhaka city and the influence of open space on their LA. Results reveal that each adolescent in Dhaka city daily spend average 4.8 hours for LA. Though this daily average

is about one hour less compared with other developed country cities (e.g. 5.6 hours for American teenagers aged 15-19 years), it is about double of the national daily average for unemployed youth aged 15-25 years in Bangladesh which is 1.81 hours. Due to having different context of the study (urban vs. rural) and difference in sample size, this difference in average daily leisure time is not unusual. Nevertheless, the results show that the daily average leisure time in Dhaka is more in the weekend (5.9 hours) than in the weekdays (4.6 hours). This difference between weekend and week days is similar to other countries or other studies. For example, leisure time in weekdays and weekend for the teenagers (15-19 years) in America is 5.13 hours and 6.64 hours respectively.

The daily leisure time for more than 60% of the adolescents' in Dhaka is usually after school or in the afternoon. Usually they spend significantly higher time for SLA (e.g. watching TV, communicating in social media, playing videogames) than the OLA or non-screen home activities. Screen-based leisure time among adolescents has increased all over the world. For example, in UK more than a third of the overall leisure time or around 14 hours per week on screens (UK office for national statistics) and the daily average 3 hours and 4 minutes in USA. Comparatively, leisure time on screens is less in Asia. For instance, in Shanghai average 86.1 minutes (weekdays) and 254.4 minutes (weekends) per week on screens (Jiang, 2014). The average time for screen leisure activities in Dhaka is 133 minutes; though it is less than the American adolescents (more than 3 hours), a large portion of the adolescents in Dhaka (42%) have already crossed the recommended limit of screen-time and the rate is increasing day by day. The 24-hours movement guidelines by Canadian Government (2017) suggested the recommended limit of screen-activities per day is 2 hours.

The average daily outdoor leisure time of adolescents in Dhaka is about 30 minutes (without considering visit to relatives' home and restaurant) which is about one fourth of American (2 hours according to Larson & Verma 2011) and less than half of UK's adolescents (68 minutes according to UK Time Use Survey 2017). Thus, the average daily outdoor time in Dhaka is very low - only 6% of the adolescents practice the recommended outdoor leisure time daily 2 hours. Adolescents in Dhaka spend most portion of the outdoor leisure time for gossiping with friends and participating in sports whilst time spend for sports and outdoor physical exercise is only 19 minutes. The pattern of outdoor activities mainly depends on the neighborhood structure and design as 79% time of their daily outdoor leisure is spent within the locality. More than half of the adolescents spend outdoor leisure time less than one-hour per day. Adolescent's rate of participation in PA at school and their leisure time do vary in different country. For example, the most common daily outdoor activity in USA for 84% children is hang-outing or playing with friends followed by biking or jogging or walking (80%) and using electronic devices like listening music or watching movies (65.3%) in outdoors (Larson & Verma 2011). Nevertheless, a strong positive relationship between OLA and physical LA of adolescents in Dhaka city was found. With every one-minute increase in outdoor leisure time of adolescents may increase 0.67-minute of their PA. Thus, a significant negative relationship was found between outdoor leisure time and screen leisure time. Screen leisure time may decrease 0.25 minute with every minute increase of outdoor leisure time and vice versa.

Adolescents in Dhaka are now practicing a low rate of OLA and very low PA whilst SLA are increasing. This pattern of LA is influenced by various factors. Though some socio-demographic factors are influential on adolescents' LA, most of the factors are related to the outdoor built environment of neighborhood such as street and building characteristics and the open spaces. Some characteristics such as quantity, size and safety of nearer open space from the residence are positively correlated with daily OLA of adolescents. The daily OLA of adolescents increases if more open spaces are available within 15-minutes of walk from home and with increased size of nearer open space. The distance of nearer open space is significantly and inversely related with adolescents' daily OLA. If the distance of nearer open space from residence is more, the less is the daily OLA.

The OLA are mostly in the priority list of desired activities for adolescents in Dhaka. An inverse scenario is observed between the desired and current practice of LA: OLA are in the top of desired list but in the middle bottom of practice list, SLA are in the middle of desired list but in the top of practice list. Current practice and desired leisure time activities are different for more than 60% of the adolescents in Dhaka. Four out of five adolescents practice screen-related activities instead of their desired outdoor activities because they do not have enough facilities for outdoor activities. That means, desired leisure activities related to outdoor are replaced, as the adolescents do not get facilities regarding outdoor leisure activities. The pattern of replaced activities was investigated and found that unavailability of open space systematically forces the adolescents, who previously liked outdoor most, diverting to screen leisure activities.

Physical inactivity is considered as the major public health concerns all over the world (Ferucci 1999). Therefore, increasing outdoor time spend could be a simple strategy to reduce the risk of illness such as developing myopia and its progression in children and adolescents (Shewin et al. 2010). However, most of the adolescents in Dhaka are unable to tap this benefit due to lack of open space. Providing outdoor open space and walking facilities could increase the overall outdoor activities of adolescents. Policymakers need to focus on supplying open spaces at neighborhood level to increase the outdoor leisure activities. Local residents should take their own initiatives to make their neighborhood open spaces, streets and common space in buildings friendly to adolescents. Building owners should be encouraged to provide easy access to the rooftops and garages for adolescents' play. Further study could be identifying the factors affecting adolescent's outdoor leisure activities in Dhaka city, quantitative measurement of the factors identified in this study, and testing the theory for Dhaka city as well as in other cities with different socio-cultural background.

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